

WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:

an insulating film formed on a substrate; and

an embedded wiring of copper or a copper alloy formed in
5 the insulating film,

wherein a barrier metal film of a metal whose
conductivity will not be lost when the metal is oxidized or
of a conductive metal oxide is formed between the insulating
film and the embedded wiring.

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2. The device of Claim 1, wherein the metal is Ru, Ir or
an alloy containing Ru or Ir.

3. The device of Claim 1, wherein the metal oxide is
15 RuO_2 , IrO_2 , or an alloy oxide containing Ru or Ir.

4. A semiconductor device, comprising:

an insulating film formed on a substrate; and

a wiring of copper or a copper alloy formed on the
20 insulating film,

wherein a barrier metal film of a metal whose
conductivity will not be lost when the metal is oxidized or
of a conductive metal oxide is formed between the insulating
film and the wiring.

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5. The device of Claim 4, wherein the metal is Ru, Ir or an alloy containing Ru or Ir.

6. The device of Claim 4, wherein the metal oxide is RuO₂, IrO₂, or an alloy oxide containing Ru or Ir.

7. A method for fabricating a semiconductor device, comprising the steps of:

forming a recess in an insulating film on a substrate;

10 sequentially depositing a barrier metal film of a metal whose conductivity will not be lost when the metal is oxidized or of a conductive metal oxide and a first conductive film of copper or a copper alloy on wall surfaces of the recess;

15 growing a second conductive film of copper or a copper alloy on the first conductive film by an electroplating process so as to completely fill the recess; and

integrating the first and second conductive films into a third conductive film so as to form an embedded wiring of the
20 third conductive film.

8. The method of Claim 7, wherein the metal is Ru, Ir or an alloy containing Ru or Ir.

25 9. The method of Claim 7, wherein the metal oxide is

RuO₂, IrO₂ or an alloy oxide containing Ru or Ir.

10. A method for fabricating a semiconductor device, comprising the steps of:

5 sequentially depositing a barrier metal film of a metal whose conductivity will not be lost when the metal is oxidized or of a conductive metal oxide and a first conductive film of copper or a copper alloy on an insulating film overlying a substrate;

10 growing a second conductive film of copper or a copper alloy on the first conductive film by an electroplating process;

integrating the first and second conductive films into a third conductive film; and

15 forming a wiring of the third conductive film by etching the third conductive film using a mask pattern covering a wiring forming region.

11. The method of Claim 10, wherein the metal is Ru, Ir
20 or an alloy containing Ru or Ir.

12. The method of Claim 10, wherein the metal oxide is RuO₂, IrO₂ or an alloy oxide containing Ru or Ir.

25 13. A method for fabricating a semiconductor device,

comprising the steps of:

forming a recess in an insulating film on a substrate;

depositing a barrier metal film of a metal whose
conductivity will not be lost when the metal is oxidized or
5 of a conductive metal oxide on wall surfaces of the recess;
and

forming a conductive film of copper or a copper alloy on
the barrier metal film to completely fill the recess and
thereby forming an embedded wiring of the conductive film.

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14. The method of Claim 13, wherein the conductive film
is deposited by a sputtering process and then caused to flow
in an oxidative-reducing atmosphere.

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15. The method of Claim 13, wherein the metal is Ru, Ir
or an alloy containing Ru or Ir.

16. The method of Claim 13, wherein the metal oxide is
RuO₂, IrO₂, or an alloy oxide containing Ru or Ir.

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17. A method for fabricating a semiconductor device,
comprising the steps of:

depositing a barrier metal film of a metal whose
conductivity will not be lost when the metal is oxidized or
25 of a conductive metal on an insulating film overlying a

substrate;

forming a conductive film of copper or a copper alloy on the barrier metal film; and

forming a wiring of the conductive film by etching the
5 conductive film using a mask pattern covering a wiring forming region.

18. The method of Claim 17, wherein the conductive film is deposited by a sputtering process and then caused to flow
10 in an oxidative-reducing atmosphere.

19. The method of Claim 17, wherein the metal is Ru, Ir or an alloy containing Ru or Ir.

15 20. The method of Claim 17, wherein the metal oxide is RuO₂, IrO₂ or an alloy oxide containing Ru or Ir.